

Algebra 1

Prerequisite: Prealgebra

The main goal of Algebra is to develop fluency in working with linear equations. Students will represent linear relationships in tables, graphs, and equations. Students will solve linear equations and inequalities and systems of linear equations and inequalities. Students will generate equivalent expressions and use formulas. Students will simplify polynomials and begin to study quadratic relationships. Students will use technology and other tools to investigate and explore mathematical ideas and relationships and develop multiple strategies for analyzing complex situations. Students will analyze situations verbally, numerically, graphically, and symbolically. Students will apply mathematical skills and make meaningful connections to life's experiences.

Standard I: Students will acquire number sense and perform operations with real numbers.

Objective 1: Compute fluently and make reasonable estimates with rational and irrational numbers.

- a. Simplify, add, subtract, multiply, and divide square roots.
- b. Evaluate and simplify numerical expressions containing rational numbers and square roots using the order of operations.
- c. Compute solutions to problems and determine the reasonableness of an answer by relating it to the problem.
- d. Relate properties and operations of rational numbers to those used with irrational numbers.

Objective 2: Classify, compare, and order rational numbers and expressions with square roots, with and without a number line.

- a. Classify numbers as rational or irrational.
- b. Order and compare rational and irrational numbers.
- c. Represent real numbers, including those with square roots, in a variety of ways.
- d. Solve problems and represent answers using exact values.

Mathematical Language and Symbols Students Should Use
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square root, $\sqrt{\quad}$, rational, irrational
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Standard II: Students will represent, analyze, and solve linear expressions, equations, and inequalities.

Objective 1: Model and interpret problems having a constant rate of change using linear functions.

- a. Write algebraic expressions or equations to generalize visual patterns, numerical patterns, relations, data sets, or scatter plots.
- b. Represent linear equations in slope-intercept form, $y = mx + b$, and standard form, $Ax + By = C$.
- c. Distinguish between linear and non-linear functions by examining a table, equation, or graph.
- d. Interpret the slope of a linear function as a rate of change in real-world situations.
- e. Model rates of change using direct variation.

Objective 2: Represent and analyze linear relationships using algebraic equations, expressions, and graphs.

- a. Write the equation of a line when given:
 - Two points.
 - The slope and a point on the line.
 - The graph of a line.
- b. Identify the x - and y -intercepts from an equation or graph of a line or a table of values.
- c. Graph linear relations and inequalities.
 - By plotting points.
 - By finding x - and y -intercepts.
 - Using the slope and any point on the line.

Objective 3: Represent and analyze the slope of a line.

- a. Identify the slope of a line when given points, a graph, or an equation.
- b. Identify horizontal and vertical lines given the equations or slopes.
- c. Determine the effect of changes in slope or y -intercept in $y = mx + b$.
- d. Determine and explain the meaning of slopes and intercepts using real-world examples.

Objective 4: Solve and interpret linear equations and inequalities.

- a. Solve multi-step, single-variable, linear equations and inequalities algebraically and graphically.
- b. Solve real-world problems involving constant rates of change.
- c. Solve linear formulas and literal equations for a specified variable.
- d. Solve proportions that include algebraic first-degree expressions.

Objective 5: Solve and interpret pairs of linear equations and inequalities.

- a. Solve systems of two linear equations graphically and algebraically with and without technology.
- b. Determine the number of possible solutions for a system of two linear equations.
- c. Graph a system of linear inequalities and identify the solution

Mathematical Language and Symbols Students Should Use
intercept, slope, slope-intercept form, linear, direct variation, rate of change, literal equation, solution

Standard III: Students will represent and analyze mathematical situations and properties using patterns, relations, functions, and algebraic symbols.

Objective 1: Simplify polynomials and the quotient of monomials.

- a. Simplify and evaluate monomial expressions, formulas, and equations.
- b. Add and subtract polynomials.
- c. Multiply monomials by a polynomial.
- d. Multiply binomials using various methods, including the distributive property, area models, and special products.
- e. Simplify the quotient of monomials.

Objective 2: Represent polynomials as the product of a monomial and polynomial, or as the product of two first-degree, single-variable binomials.

- a. Find the greatest common monomial factor of a second- or third-degree polynomial.
- b. Factor trinomials of the form $ax^2 + bx + c$ when $a = 1$.
- c. Recognize the difference of two squares and perfect squares of binomials.

Objective 3: Solve quadratic equations using inverse properties and factoring.

- a. Solve quadratic equations that can be simplified to the form $x^2 = a$ where $a \geq 0$ using inverse properties.
- b. Solve quadratic equations using factoring.
- c. Write a quadratic equation when given the solutions.

Objective 4: Solve problems using the Pythagorean Theorem.

- a. Illustrate why the Pythagorean Theorem is valid using a variety of methods.
- b. Solve problems using the Pythagorean Theorem.

Mathematical Language and Symbols Students Should Use
simplify, evaluate, monomial, binomial, polynomial, degree, factor, difference of two squares, quadratic, Pythagorean Theorem

Standard IV: Students will apply concepts and methods from statistics to solve real problems.

Objective 1: Summarize, display, and analyze bivariate data.

- a. Collect, record, organize, and display a set of data with at least two variables.
- b. Determine whether the relationship between two variables is approximately linear or non-linear by examination of a scatter plot.
- c. Characterize the relationship between two linear related variables as having positive, negative, or approximately zero correlation.

Objective 2: Estimate, interpret, and use lines fit to bivariate data.

- a. Informally estimate the equation of a line of best fit to make and test conjectures.
- b. Interpret the slope and y-intercept of a line through data.
- c. Predict y-values for given x -values when appropriate using a line fitted to bivariate numerical data.

<p style="text-align: center;">Mathematical Language and Symbols Students Should Use scatter plot, positive correlation, negative correlation, line of best fit, bivariate</p>
